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Appl. No. 10/783,495  
Amdt. dated 03/05/2008  
Response to Office action of 11/05/2007

Attorney Docket No.: N1085-00251  
[TSMC2003-0834]

**Amendments to the Claims:**

This listing of claims will replace all prior versions and listings of claims in the application:

- 1 1. (Currently Amended) A method for controlling exposure energy on a patterned  
2 wafer substrate, comprising the steps of:  
3 controlling the exposure energy with a feedback process control signal of critical  
4 dimension,  
5 and further controlling the exposure energy with a feed forward process control  
6 signal of a compensation amount that compensates for wafer thickness variations, by  
7 combining the feed forward control signal with the feedback process control signal to  
8 control the exposure energy,  
9 the critical dimension being one of a width, a spacing and an opening of the  
10 patterned wafer substrate.
- 1 2. (Cancelled)
- 1 3. (Original) The method of claim 1, further comprising the step of: supplying the  
2 feed forward process control signal by a feed forward controller.
- 1 4. (Original) The method of claim 1, further comprising the step of: controlling the  
2 exposure energy by a feed forward control signal of an interlayer thickness  
3 measurement.
- 1 5. (Previously presented) The method of claim 1, further comprising the step of:  
2 controlling the exposure energy by a feed forward control signal of an interlayer  
3 thickness measurement remaining after chemical mechanical planarization thereof.
- 1 6. (Original) The method of claim 1, further comprising the step of: calculating the  
2 compensation amount according to a polynomial function with a coefficient of the

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3 function being based on a measurement of a remaining thickness of a planarized  
4 interlayer.

1 7. (Previously presented) The method of claim 1, further comprising the step of:  
2 calculating the feedback process control signal of critical dimension measurement of a  
3 top layer in a previous manufacturing lot.

1 8. (Previously presented) The method of claim 1, further comprising the steps of:  
2 calculating the compensation amount according to a polynomial function with a  
3 coefficient of the function being based on a measurement of a remaining thickness of a  
4 planarized interlayer; and calculating the feedback process control signal of critical  
5 dimension measurement of a top layer in a previous manufacturing lot.

1 9. (Currently Amended) The method of claim 1, further comprising the steps step of:  
2 calculating the compensation amount according to a polynomial function with higher  
3 order coefficients set at zero.

1 10. (Currently Amended) The method of claim 1, further comprising the steps step of:  
2 calculating the compensation amount according to a linear function.

1 11. (Currently Amended) The method of claim 1, further comprising the steps step of:  
2 calculating the compensation amount according to a segmented linear function.

1 12. (Currently Amended) A system for controlling exposure energy on a first  
2 patterned wafer substrate, comprising:  
1 a feed forward controller providing a feed forward control signal to an exposure  
2 apparatus based on a thickness measurement of an interlayer of the first patterned  
3 wafer substrate for controlling the exposure energy focused on a top layer of the first  
4 patterned wafer substrate, and

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5 a feedback controller providing a feedback exposure energy control signal to the  
6 exposure apparatus based on critical dimension measurement of a top layer of a  
7 second patterned wafer substrate of a previous manufacturing lot, the critical dimension  
8 being one of a width, a spacing and an opening of the second patterned wafer  
9 substrate,

10 wherein a combiner combines the feed forward control signal and the feedback  
11 exposure energy control signal to produce a combined signal that is provided to the  
12 exposure apparatus.

1 13. (Original) The system of claim 12, further comprising: a thickness measurement  
2 device providing thickness measurement data to the feed forward controller.

1 14. (Currently Amended) The system of claim 12, further comprising: a criteria  
2 critical dimension measurement device providing critical dimension measurement data  
3 to the feedback controller.

1 15. (Previously presented) The system of claim 12, further comprising:  
2 a thickness measurement device providing thickness measurement data to the  
3 feed forward controller and  
4 a critical dimension measurement device providing critical dimension  
5 measurement data to the feedback controller.

1 16. (Previously presented) The system of claim 12, further comprising: a thickness  
2 measurement device providing thickness measurement data of a shallow trench  
3 isolation layer of the first patterned wafer substrate to the feed forward controller.

1 17. (Currently Amended) The system of claim 12, further comprising: a criteria  
2 critical dimension measurement device providing critical dimension measurement data  
3 of a poly-gate of wafer substrate of a previous manufacturing lot.

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- 1 18. (Currently Amended) The system of claim 12, further comprising:  
2 a thickness measurement device providing thickness measurement data of a  
3 shallow trench isolation layer of the first patterned wafer substrate to the feed forward  
4 controller, and  
5 a critical dimension measurement device providing ~~criteria~~ critical dimension  
6 measurement data of a poly-gate of a previous manufacturing lot.
- 1 19. (Currently Amended) The system of claim ~~[[12]]~~ 18 wherein,  
2 the feed forward controller is user configurable by having one or more polynomial  
3 coefficients set to zero in a polynomial function model.
- 1 20. (Original) The system of claim 12 wherein;  
2 the feed forward controller is user configurable by having one or more polynomial  
3 coefficients set to zero in a polynomial function model.
- 1 21. (Previously presented) The system of claim 20, further comprising: a thickness  
2 measurement device providing thickness measurement data of a shallow trench  
3 isolation layer of the first patterned wafer substrate to the feed forward controller.
- 1 22. (Previously presented) The system of claim 20, further comprising: a critical  
2 dimension measurement device providing critical dimension measurement data of a  
3 poly-gate of the second patterned wafer substrates of a previous manufacturing lot.